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GLASGOW

OBSERVATIONS

ON

THERAPEUTICS AND DISEASE.

BY

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P R E F A C E .

THE instability of methods of cure, and the transitory popularity of remedial agents, have ever been deplored by the most intelligent practitioners of medicine, and have naturally evoked the sneers of the most discriminating beyond its pale. Confessedly, the science of therapeutics has followed with unequal step the rapid advances made in the pathology and diagnosis of disease; and it is in this department that the charge of empiricism can be least successfully refuted.

Fashion is potent, unfortunately, in medical, as in other matters; and as individual preferment is to such an extent dependent on a subserviency to it, the science of medicine is suffering in consequence. The dalliance with new remedies was never perhaps more manifest than at the present time. In no department of study is the deduction of reliable conclusions more difficult than in medicine; and in none, consequently, should the life-long labours of men of acknowledged ability be treated with greater respect, or ruthlessly discarded without the most scrupulous investigation.

While admitting unreservedly that some valuable additions have in recent times been made to our *materia medica*, and may yet be made, I am of those who believe that to a great extent retrogression, and not progression, has been the result of not a few innovations. I entertain the conviction, therefore, that he who introduces a new remedy, save on the grounds of comparative superiority over other remedies of the particular class to which it belongs, which he is unable to reconcile to some physiological or pathological principle, or as the result of conscientious comparative trial antecedently conducted, does a positive injury to the science of medicine, and that the

penchant for novelty in remedies is a human weakness which no upright practitioner ought unadvisedly to encourage. Of alleged facts there is no dearth: it is in their arrangement, reconciliation, and the estimation of their value as such, that the difficulty lies; and it appears to me, that if each one submitted to professional judgment the theory on which his prescription is based, far more benefit might reasonably be anticipated than from the ephemeral pursuit of panaceas. These considerations must be my apology for the appearance of the following observations in their present form. To what extent the views therein contained may be in harmony with the opinions of others, I have no means of determining.

D. C. B.

GLASGOW, *May*, 1870.

THERAPEUTICS AND DISEASE.

“Sunt delicta quibus non ignovisse velimus,
Nam neque chorda sonum reddit quam vult manus et mens,
Nec Semper feriet quodcumque minabitur arcus.”—*Hor.*

IN two papers on Syphilitic and Phagedenic Ulceration which the *Lancet* did me the honour to publish a short time ago, I very briefly, and no doubt very imperfectly, endeavoured to indicate a few general principles regarding the pathology of those diseases as I apprehended, and in accordance with which I conceived a certain class of remedies to have acted as therapeutic agents. Mature deliberation on these subjects has corroborated the conviction then enunciated that those views admit of a much wider generalization, comprehend the fundamental principles of a sound and rational pathology, and are thus capable of throwing light on the *modus medendi* of our remedial agents—a subject confessedly too much under the sway of routine and empiricism, hitherto less studied than the importance of the subject demands, and generally as little understood.

In therapeutics, I hold that the great desideratum is to make our remedial agents subserve to those chemical and physiological conditions which constitute life; and it appears to me that possessing, as we now do, an approximate knowledge of those conditions which constitute health, in so much should our knowledge of disease be advanced, and the great end of medical science, the prevention and mitigation of human suffering, be furthered. It need not be urged that unless we possess a correct appreciation of the state of health, that of its opposite must be at best conjectural. It is from this

grand standpoint that the scientific physician ever views disease, and from which in humble emulation the following hints are offered. Life has been aptly defined as organization in action, and that action is sustained in its normal state by the due performance of two antagonistic functions, which it may be convenient to term the histolytic, and histogenetic functions: and to this process the term assimilation applies in its widest significance. It is this development into the peculiar structures of the living organism, the ultimate ejection in turn by the excretory organs of such material as has filled its requirements in the economy, or the elaboration of part by the secretory organs for ulterior use, properly performed, which constitutes health; and it follows as a corollary that the derangement of one or other of these functions is an invariable manifestation of, or may constitute disease, and that their complete cessation is death.

Did space permit it might be desirable, for the sake of a more general coherency, to review the functions of digestion and absorption; but consideration of these the limit of these papers forbids. It must suffice as preliminary to the subject proper of these observations, to consider briefly the functions assigned to the blood; and these, to quote from Dr Gregory, are fourfold:—"1st, It has to enable the tissues, by oxidizing them, to perform their functions; 2nd, To repair the waste of tissue; 3rd, To effect, by the oxygen it carries, the oxidation of the respiratory food, or the production of heat; 4th, To concoct, or assist in concocting, out of the first products of oxidation, the various secretions and excretions.

1st, The blood has to enable the tissues, by oxidizing them, to perform their functions. Paradoxical as it may appear, we know that the proper function of the tissues culminates in their destruction; and the agent by which this is accomplished is oxygen—it is the histolytic agent. The tissues in the first place are not, however, entirely thrown off from the system; they are resolved into *secretions* as well as *excretions*; to which end the blood returning from the lungs is impregnated with oxygen, which from the capillaries unites with the effete tissues, forming, as the case may be, carbonic acid (CO_2), water (HO), urea ($\text{C}_2 \text{H}_4 \text{N}_2 \text{O}_2$). &c.

"It was formerly believed," remarks Claude Bernard, "that oxygen introduced into the lungs was there and then combined to the elements of the blood, creating in this manner a sort of combustion within the air cells, from which the carbonic acid exhaled.

and the animal heat produced during the process of respiration were both derived. But the operation is more complicated than our predecessors supposed; and we are now aware that the combination of oxygen with the cast-off materials of the economy takes place, not within the lungs, but in the very depths of the tissues themselves; and that so long as this gas (CO_2) remains in the blood, the respiratory process is not accomplished." Then with reference to the capillaries this distinguished physiologist observes:—"We know these delicate vessels to be the principal seat of nature's chemistry; in this point do the elements of our blood come in contact with the elements which compose our tissues, and enter into combination with them."

2nd, The blood has to repair the waste of tissue. It is merely necessary to observe under this head that the new supply of tissue-forming material, the histogenetic material, incorporated with the pure or oxidized blood from the left side of the heart is with it dispersed throughout every part of the body. As soon as any portion of tissue is thus oxidized, the blood from the arterial capillaries replaces it by the new material, which for a time exists as flesh, but is in its turn deposited by a more recent supply, taken up, and forming part of the venous blood, elaborated into a secretion, or ejected as an excretion.

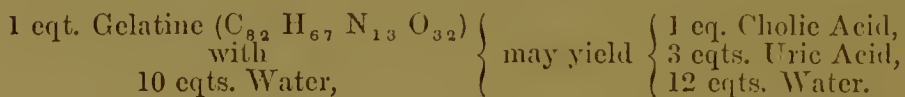
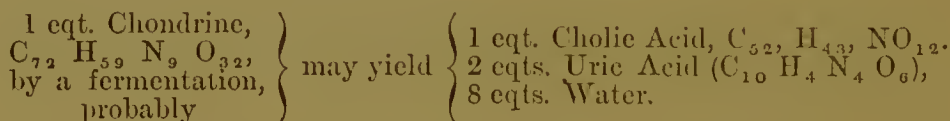
3rd, The blood has to effect, by the oxygen it carries, the oxidation of the respiratory food. Heat appears essential to the chemical changes which take place in the capillaries; and this is generated by the combination of oxygen with the respiratory or non-nitrogenous principles, which chiefly contain carbon, and must be oxidized in order to elimination as a natural excretion.

4th, The blood has to concoct, or assist in concocting, out of the first principles of oxidation, the various secretions and excretions. The *secretions* serve an ulterior office in the economy, and are elaborated by special organs; while the *excretions* are ejected as peccant material, representing more especially the ultimate disintegration of organized tissues. For a moment, then, we shall briefly advert to the secretions and excretions of the human body, and consider how they are formed.

The excretions are discharged by the lungs, kidneys, skin, liver, and intestines. These organs are essentially the purifiers of the blood—the safety valves of the animal machine. The principal secretions, on the other hand, are those of the pancreas, salivary

and mammary glands, the liver, and synovial membranes. On the latter it is not my purpose further to dilate, but pass to a brief *seriatim* notice of the excretion of each depuratory apparatus just alluded to.

THE OFFICE ASSIGNED TO THE LUNGS is the removal of (CO_2 and HO .) carbonic acid and water. Whence, then, this carbonic acid and water? The first function above assigned to the blood, we observed, was that of enabling the tissues, by oxidizing them, to perform their functions. Thus albumen, for instance, an important constituent of the tissues, having fulfilled its requirements in the system, may undergo the following degradations—"It may be," remarks Gregory, "in the following manner, or in some way approximating to it, for all the facts we know prove that in the animal body every change is the result of oxidation more or less complete, or of transformation with or without the addition of water. Thus albumen, according to Gregory, is convertible into choleic acid, cholic acid, urea, and carbonic acid; or cholic acid may be formed, besides various other products of oxidation, from chondrine and gelatine, as follows:—



(Gregory.)

Besides, carbonic acid may be formed in many other decompositions. This gas is unquestionably formed in the tissues by oxidation; and as we have already seen, "while it remains in the blood the respiratory process is incomplete."

THE EXCRETIONS FROM THE SKIN consist of carbonic acid, watery vapour, and sebaceous matter. In the sweat, Berzelius found lactic acid, chloride of sodium, and muriate of ammonia.

Having thus disposed in a most cursory manner of carbonic acid gas as an excretion, and partially of water, we proceed to a brief consideration of the important FUNCTIONS ASSIGNED TO THE KIDNEY. These are the excretion of phosphorus, lime, magnesia, water, and the nitrogenous compounds, urea, uric acid, and hippuric acid; of the phosphatic compounds, phosphates of soda, ammonia, lime, and

magnesia ; of the sulphur compounds, sulphates of potash and soda. The rest consist of water, mucus, and extractive matter, with traces of other salts ; urea forms nearly one-half of the solid constituents of the urine. It is probably the resultant of the oxidation of nitrogenous tissues, and may be formed as above. It may also be derived from unassimilated nitrogenous elements circulating with the blood. Urea exists ready formed in the blood, and is merely removed by the kidneys, not elaborated by them. Uric and hippuric acids have the *same* origin ; but in *healthy* urine exist, *if at all*, but in exceedingly minute quantity. The saline matters existing in the urine likewise result from the disintegration of tissues, of which they form part

THE FUNCTIONS ASSIGNED TO THE LIVER are excrementitious and digestive. It is consequently an organ which both secretes and excretes. It removes, it is believed, something from the blood which if retained would be injurious ; and this appears to be some compound of carbon and hydrogen. At the same time while this peccant compound is removed by the bile, it (the bile) assists in the process of digestion, some of it being reabsorbed, and some ejected by the bowels ; that part which is absorbed being probably removed by the lungs. The intestines remove the rejected portion of the food, and earthy matter, in considerable quantity derived from the excretory glands in the course of the intestinal canal. But while the foregoing changes are chiefly effected through the medium of the blood-vessels, there is yet an important system of vessels whose functions contribute in no small degree to the maintenance of life, I refer to the lymphatic system. Of the real nature of their functions there yet remains some doubt. “It may, however, be held as highly probable,” says Kirkes, “that the materials which it is the special office of the lymphatics to absorb, are like those commonly absorbed by the lacteals, chiefly of a nutritive kind, capable of higher organization, and of contributing to the nutrition of the body. Whether these are derived exclusively from the liquor sanguinis effused for the nutrition of the tissues, or from the fluid with which the tissues are kept moist, or, in part also, from the degenerated or used portions of the tissues, cannot yet with certainty be determined. Parts which, having entered into the composition of a tissue, and having fulfilled their purpose, require to be removed, may not be altogether excrementitious, but may admit of being reorganized and adapted to the nutrition of the same or some lower tissue.” And again : “In the absorption by the lymphatic or lacteal vessels, there

appears something like the exercise of choice in the materials admitted to them. . . . It is probably a general truth, that, in parts which are supplied with blood-vessels and lymphatics, the lymphatics (or lacteals for the intestines) absorb only such materials as will form lymph and chyle for the replenishing of the blood; while the blood-vessels absorb all other materials, and such substances as are accidentally brought into contact with them."

These, then, constitute the purifying and sustaining apparatus of animal life. Animal tissue is resolved, as we have seen, into the *excretions* referred to, and in the manner indicated. The composition of these several excretions is, in health, constant; and the absence of any one of them, their deficiency or superabundance, is an invariable manifestation of or may constitute disease. It must be apparent, therefore, as Dr Bennett remarks, that our knowledge of the animal economy, and of the diseases to which it is liable, can only be elucidated by investigating the nature of such chemical and structural changes, together with the necessary relation that each one bears to the others; and that it is on such kind of knowledge alone that medicine as a scientific art can ever repose.

Even as the most complicated and abstruse mathematical demonstrations are based upon the twelve well-known axioms of Euclid, so do I believe are the incontrovertible principles on which medicine as a science must be reared, embodied in our knowledge of the foregoing functions. I submit that the following propositions may be legitimately deduced from the above:—1st, That the harmonious performance of histogenesis and histolysis constitutes health. 2nd, That a class of diseases devitalizes by a preponderance of the histolytic function of assimilation. 3rd, That to an insufficient oxidation of effete tissue (or the converse of the second proposition) or inadequate elimination, a class of diseases *sui generis* may be ascribed. 4th, That apart from those many diseases are due to irritation specifically or non-specifically produced. The first proposition we have already considered. To the second division I would refer all diseases comprehended under the generic term fever—all constitutional disturbances manifesting a tendency to excessive wasting, and causing death directly thereby; or by the supervention of some local inflammatory disorder, originating, some possibly in an auto-genetic poison, others (and I should be inclined to suppose the great majority) in some extraneously formed poison imbibed by the lungs, and which in the present state of our knowledge cannot be isolated.

To the third class, gout, rheumatism, oxaluria, neuralgia, calculous diseases, scrofula, diabetes, and probably scarlatina, diphtheria, cancrum oris, hospital gangrene, &c., erysipelas, puerperal fever, and all their local as well as general manifestations; the first group of this division induced by habit of body, the second or problematical by the introduction of a morbid agent into the blood. And under the fourth section are the various diseases of which inflammation and its pathological consequences, local and constitutional, are the most striking manifestations.

But to attempt a justification of this division. It is not my intention at this stage of our review to endeavour to submit an exhaustive classification based on the foregoing views. I shall content myself with one or two types; and under the first group of diseases my selection naturally falls upon typhus, as fever *par excellence*. What, then, is fever? Than fever there is no term in the whole range of medical nosology subject to more misrepresentation. In common parlance if a patient have a hot skin, thirst, and frequent pulse, he is said to be feverish; and in too many instances to make this admission is taken as an implication that the patient is labouring under a specific fever, whereas those symptoms are not necessarily associated with the action of a specific poison, but may be symptomatic of wounds, or other surgical affections. By fever proper I understand the constitutional effects of a morbid agent introduced into the blood, as manifested in excessive heat of skin, thirst, accelerated action of the heart, and excessive destructive assimilation of tissue, frequently accompanied with delirium and localised inflammations.

Any agency capable of interfering with the structural changes above described must be viewed as a poison, and as such capable of inducing disease. Inasmuch as these changes are various, and are variously affected in different diseases, I infer that the ultimate chemical composition of morbid agents must vary, and that disease can rationally be combated only by keeping in view the particular effects thereby produced, and by thus making remedies subservient to the correction of such perverted actions. Thus in the case of fever destructive assimilation is preternaturally active, and the constructive consequently inadequate to the sustaining of the body in its healthy equilibrium. The action of poisons on the system has by many writers been referred to as illustrating by analogy the various zymotic diseases. Why it is that hydrocyanic acid ($C_2 N, H$) causes

death by a marked impression upon the organs regulated and controlled by the pneumogastric nerve, strychnine ($C_{42} H_{22} N_2 O_4$) in a more particular manner on the voluntary muscles of the body, while the component parts of these poisons are constituents of the system, we cannot explain. Why it is that typhus fever causes the effects alluded to, while scarlatina, diphtheria, &c., induce structural changes of a very different nature, is equally inexplicable, but we must accept the facts established as they are by common observation and experience.

In the above definition of fever, *excessive heat* was first enumerated among the symptoms of the febrile state; and of all other symptoms it is the most striking and most invariable. How the heat of the body is maintained we have already considered—generated, as we have seen, in the depths of the tissues by the union of oxygen with the effete structures; and in any case, the greater the heat of the body, the greater may we, *a priori*, assume to be the destruction of tissue, and the greater the conversion into the excretions above described. Accordingly do we find this to be the condition in fever. “It is this preternatural heat,” says Aitken, “which is the essential symptom in fever, which proves fever to be present, and which exists to the extent of 4° , 6° , or even 8° Fahrenheit, over the natural limits of health. This preternatural heat is never absent in fever; and without it fever cannot be said to exist. In consequence then of the preternatural predominance of histolysis, there is a considerable diminution of fibrine in the blood. While in health, the proportion is from 2 to 3 parts in 1000, in typhus and other diseases of a low type it may be as little as 1.034 (Kirkes); and for the same reason the specific gravity of the urine is much higher. True, Dr Parkes has shown that “a higher temperature is represented in the excretions in *some* cases by a larger, and in other cases by a smaller quantity of urea, sulphuric acid, and probably carbonic acid;” but even in those which might be called the exceptional cases, we are not forced to the conclusion that there is not increased metamorphosis. Dr Parkes’ explanation of this apparent anomaly is as follows:—“It is evident that more chemical change may go on in the body than is represented by the excreta. The metamorphosis of blood or of tissue may not be carried to the point of those principles which can alone pass through the eliminating organs. A vast amount of imperfectly organized (oxidized?) compounds may be formed and retained in the system, circulating with the blood, or being thrown

upon certain organs. Thus there may be increased metamorphosis with lessened elimination." Again, it is urged that in the febrile state water is retained in the system, and thus Dr Parkes considers "the concentration of urine almost as good as an index of the amount of fever as the temperature itself." Now, without any desire of unduly speculating, may it not be possible that water as such is not retained in the system, but that its formation may to a great extent be prevented by the excessive tissue destruction. Thus, oxygen may have under those conditions a greater affinity for the solids of the urine, that they by being sufficiently oxidized may reach the emunctories in a soluble form, and not as uric acid, and other insoluble suboxygenated products of disease.

But besides these symptoms, localised inflammations and delirium have been classed under the category of symptoms constituting fever. I think the phenomena of the crisis are capable of throwing some light on these conditions. "It is in the febrile cases," says Aitken, "with diminished excreta, that at a later period of the disease, copious discharges from one or other of the eliminating organs, occur. Such discharges occurring during the progress and termination of a febrile disease have been termed *critical*—the occurrence being called a *crisis*; and the particular day on which it happens, counting from the day of the seizure, has been called the *critical day*. The term *crisis* or *critical* is applied because the occurrence of such discharges is usually coincident with more or less sudden fall of temperature, and general improvement in the condition of the patient, whose convalescence dates from the critical day, when in common language his disease is said to have 'got the turn.' In such cases, therefore, a large amount of partially metamorphosed substances are retained until they are suddenly discharged, and the system is suddenly freed from the noxious compounds; and coincident with the critical discharge is the lowered temperature."

Since I began to think on this and other medical subjects, I have entertained the conviction, elsewhere expressed,* that even as particular medicines act on, and are eliminated by, particular organs, so are the poisons engendering disease disposed of by the *vis medicatrix nature*. Thus that of diphtheria and scarlet fever by the faucial mucous membrane; that of enteric fever in a more especial manner by the gastro-intestinal mucous tract; and that of typhus by one or

* On Syphilitic and Phagedenic Ulceration—*Lancet*, Vol. II., 1866.

other of the localised inflammations incidental to the disease. Thus in cases in which there appears diminished urinary excretion it seems highly probable that the kidneys may be in a state of inflammatory congestion, and thus the urea and other urinary constituents may be unduly retained; and that the occurrence of this discharge simply indicates the resumption of its proper function by any such excretory organ, the exhaustion of the poison, and the resilience of healthy action.* When the system, in short, is under the influence of a poison whose presence has not been anticipated by nature, and for which consequently no excretory apparatus has been assigned, the duty of eliminating it seems to be imposed upon particular parts of the body, which may be said to be virtually extemporised as excretory organs. Thus may be accounted for, the frequent occurrence of epistaxis in enteric fever; the delirium in consequence of meningeal inflammation or irritation; the diarrhœa which occurs during the progress of the disease, as well as the critical diarrhœa which is not unfrequently observed in the advanced stage. These then are the conditions common to all the pyrexia, and on which the only rational treatment must needs be founded. As to their intimate cause, we must admit the entrance of a morbid agent into the circulation; that of typhus, engendered by overcrowding and other insanitary conditions; of typhoid, more particularly by the decomposition of organic matter, arising frequently from defective drainage and contaminated water. In the *Lancet*, for February, 1864, I have recorded an isolated outbreak of typhoid fever clearly traceable to these conditions. To recapitulate them, the essential characteristics of the pyrexia are preternatural destructive assimilation, as manifested in diminution of fibrine in the blood, and augmentation in the excretions of the result of tissue change, rapid emaciation and localised inflammations.

We turn now to a class of diseases that present to my mind exactly opposite conditions—a class of diseases, *sui generis*, DUE, AS I BELIEVE, TO INSUFFICIENT OXIDATION OF EFFETE TISSUE, OR INADEQUATE ELIMINATION. These I have divided into (A) *those induced by habit of body*; (B) *those induced by the introduction of a specific poison into the blood*, or in general terms, those denominated the *septicæmæ*.

In the group we have left there appeared to have been, as an

* “On Syphilitic and Phagedenic Ulceration.”

essential accompaniment, an augmentation of the natural excretions. We now come to a group intimately associated with abnormal products, and these are lithic acid, lactic acid (?), and oxalic acid; while as regards the amount of fibrine in the blood, the opposite condition obtains to that in the pyrexiaë. Thus, in acute rheumatism the blood is found to consist in 1000 parts (Alderson on rheumatism) of

805·4	parts water,
6·7	„ fibrine,
101·0	„ blood corpuscles,
86·0	residue of serum.
999·1	

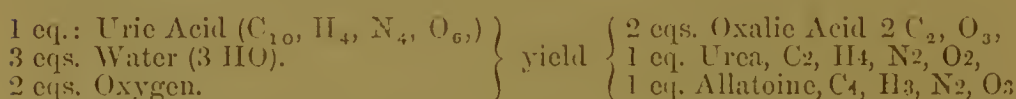
The solid residuum of the serum gave an average of inorganic constituents 7·9 in 1000 parts. As in healthy blood the component constituents are

790	parts water,
3	„ fibrine,
127	„ blood corpuscles,
80	„ residue of serum,
1000	

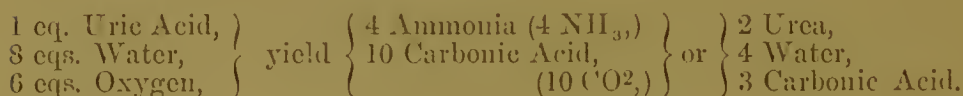
it is apparent that in rheumatism fibrine is present in more than double the usual proportion. By still more recent investigations, the proportion of fibrine in healthy blood has been ascertained to be considerably below 3 parts in 1000. The excess, then, in rheumatism may be assumed to be even greater than appears in these tables.

How then is the excess of fibrine to be accounted for? “The precise constitution,” says Kirkes, “of the blood is adjusted by the balance of the nutritive process for maintaining the several tissues, so that none of the materials appropriated for the maintenance of any part may remain in excess in the blood. Thus each part is in relation of an excretory organ to all the rest. For example, if the muscles did not take material for their nutrition, there might be an excess of fibrine, and their other constituents, in the blood; if the bones did not do so, the salts of lime might be in excess, and so on.” We have seen that fibrine constitutes an important component of the body, and of food. In order to its perfect assimilation, the effete tissues must be thoroughly oxidized; and to this end a due supply of oxygen must be furnished by respiratory food, and a sufficient amount of exertion, whereby the circulation may be accelerated, the depth of the respiration increased, and more oxygen thus inhaled.

"This is the reason," says Gregory, "why carnivorous savages must lead a life of continued exertion, as they generally do, in hunting for their food. For the same reason carnivorous animals in confinement are always in motion, except when asleep. It is thus obvious that disordered assimilation, causing an excess of fibrine to accumulate in the blood, may be induced by sedentary habits, and an inordinate indulgence in sanguineous, or highly nitrogenized food. And does it not accord with experience that it is this class of patients that gout, rheumatism, neuralgia, and oxalaria, &c., are more frequently found? But turning next to the important functions assigned to the kidneys, in this class of diseases, instead of the clear, transparent, amber-coloured urine, compatible with health, it is found to be muddy in consequence of the presence of urates to an abnormal extent, to be frequently scanty, and acid to test paper. the skin is bathed with an acid perspiration, the saliva is acid, and even the breath smells acid. Urea and uric acid are the result of varying degrees of oxidation of effete tissue; "but when the latter is formed in warm-blooded animals it must be further oxidized so as to yield soluble compounds, or else by its insolubility it is deposited, producing calculous diseases. In general all the uric acid but a very small portion is thus oxidized, and the results are,



or by more complete oxidation,



It will be observed that the less complete oxidation of uric acid (itself the product of insufficient oxidation) produces, besides urea, oxalic acid and allantoine. Oxalic acid when it does thus occur in the blood is apt to combine with lime, forming calculi of the insoluble oxalate of lime. Allantoine is found in the allantoic fluid, or foetal urine; and in the urine of very young animals, in which respiration, and consequently oxidation, is somewhat imperfect. But when the oxidation is complete, urea or ammonia, carbonic acid gas, and water, are the products."

Lithic acid, it is generally believed, constitutes the *materies morbi*

of gout and rheumatism. In the former it is peculiarly prone to combination with soda, and to deposition in this form round the joints. With lithic acid as a morbid product, oxalic acid, and the diathesis named therefrom, are, as we have seen, intimately associated; and these products being imperfectly oxidized representatives of natural excretions may arise from,—1st, Diminished respiration, by whatever cause produced, as by sedentary habits, &c.; and 2nd, as remarked by the late Dr Easton, “In those who indulge in highly nitrogenous articles of diet, and in whom over-production of uric acid, irrespective altogether of deficient elimination, must follow as a matter of course.” The dependence of oxalic acid upon uric acid has been further demonstrated by Wohler and Frerichs, who found that uric acid introduced into the organism was followed by the presence of oxalate of lime in the urine: and more recently Dr Garrod has witnessed the production of the same acid from the decomposition of the blood serum. Again, the following striking analogies are apparent between gout, rheumatism, and neuralgia. The tissues affected are the fibrous tissues, in rheumatism, the sheaths of muscles, tendons, aponeurosis, bursæ, capsular ligaments, pericardium, endocardium, &c., those structures, as Dr Fuller remarks, “from the decomposition of which in the wear and tear of the body are formed the secondary organic compounds, the lithic and lactic acids, with which gout and rheumatism are intimately connected;” while in neuralgia, the structure affected does not seem to be the nerve fibre, but the neurilemma or fibrous investment, and the urine is found to contain large quantities of oxalate of lime. These acids then being adventitious products, and no special organs having been designed for their elimination, the duty of eliminating the peccant material seems to be imposed vicariously on the fibrous structures of the body,—at all events, some strong affinity subsists between them. I have purposely omitted referring, except in the most incidental manner, to the lactic acid theory, propounded by Simon, Prout, Berzelius, and others, as the more recent experiments of Liebig prove that no lactic acid is ever to be detected in the animal fluids. But though uric acid may be formed, and give origin to this group of diseases as above, it is not at all improbable that the excretory organs may, if diseased, by preventing elimination, occasion them also. Thus though there might be sufficient oxidation of effete tissue—though, in short, the normal excretions may be formed—if there be deficient cutaneous or renal elimination, the

retention of these principles which ought to have been ejected may produce disease—a circumstance doubtless indicated in local rheumatic symptoms, by the sudden arrest of the cutaneous exhalation by damp, &c. Thus I believe lithic acid and its compounds to be the *materies morbi* of gout and rheumatism; and oxalic acid and its compounds to constitute that of calculous diseases, and the various forms of neuralgia; that these acids are suboxygenated excretions, and as such causes of disease, induced, as indicated, by habit of body.

Under this group I have likewise included scrofula, believing, as I do, that tubercle is one of the numerous exponents of retrograde metamorphosis. Of tubercle, the following facts are predicable. In its chemical composition carbon predominates, and it is through the lungs that carbon is chiefly eliminated from the body. Its most common seat is primarily in the lymphatic glands, then in the albuminous and fibrous textures. It may possibly represent to a great extent the material which ought to be eliminated from the body by the lymphatics, or through them elaborated for ulterior use in the economy, and which by some perversion of the nutritive process has not been disposed of naturally. “In scrofulous persons,” says Dr Bennett, “we see nutrition impeded. The nitrogenized elements are in excess; the evacuations even become albuminous, and are glairy like the white of egg; gradually the albuminous principle of the blood becomes predominant; while the globules are diminished in quantity; at the same the nine fatty or carbonized principle disappears, and emaciation takes place; at length albumen is deposited in the textures, constituting tubercular effusion, the destructive effects of which on organs essential to life are ultimately fatal.” In connection with our argument I quote the following important passage from an unfortunately short-lived, though ably conducted periodical, the *Stethoscope*:—“In fever with little or no food taken—with no ingesta in fact, the urine is loaded with nitrogenous compounds; that is to say, with one of the sources of nitrogenous products in the urine cut off by the abstinence from food, the kidneys excrete nitrogen as urea, &c., in increased quantity. Every one knows that the source of the latter, in the absence of nitrogenous ingesta, is the destruction of the tissues, as shown by the accompanying emaciation.” “Now,” says Dr Simms, “if in phthisis we have rapid emaciation, showing active destruction of tissue, and yet less nitrogenous matter in the urine (according to

E. Becquerel, the quantity of urea midway in the course of phthisis is only one-fourth the quantity in health) what becomes of the result of such destruction of tissue. Is it possible to conceive that rapid emaciation can take place accompanied by diminished excretion of area without an accumulation of broken-down tissue in the blood? It is no answer to say that the night sweats, diarrhoea, and expectoration make up the diminished excretion of urea, for to be expelled by those emunctories, the nitrogenous substances must first be in the current of the circulation, which is all we contend for. It is demonstrable, also, that the effete tissue, the result of destructive assimilation, cannot be metamorphosed into substances suitable for the kidneys to expel, or else we should detect them in the blood, as in suppression of urine; therefore there must be diminished *conversion* of effete tissue, and the blood must contain more than the ordinary quantity of effete tissue in solution, and must be in a condition to deposit it outside the vessels." On the foregoing I would just remark that the emaciation is secondary, not primary; is an effect, not a cause of tuberculosis: and I would ask, if the nitrogenized elements are in excess in the blood, if it contains an excess of albumen, if the urine contains only the one-fourth of the quantity of urea that it does in health, can it be doubted for a moment that there is deficient oxidation? Again, tuberculosis presents analogies to rheumatism in that the tissues primarily affected are the same, viz., the white tissues, such as cartilage, tendon, serous membrane, &c.; and thus Dr Head, in the periodical from which we have already quoted, remarks, "Possibly, we say, phthisis resembles rheumatic fever more nearly than is imagined; for when we remember that the air cell—the special, though not the exclusive seat of tubercle—loses the mucous lining of the minute bronchial tubes, fading imperceptibly in structure till it assumes a serous aspect, and in this state represents a large superficial area extending through the entire lung, of a membrane more closely allied to the serous type of construction than any other. . . . The reason why the lung is selected as the spot for the deposition of tuberculous matter, is partly from the great amount of surface, resembling more a serous than any other that enters into its composition. . . . Again we see why the deposition should commence in the upper lobes, because there is a greater amount of interstitial connective tissue here than in the lower. The left lung is more deeply excavated than the right to receive the heart, and consequently its convex and concave

surfaces of serous membrane are nearer than on the right side; and if subjected to scrofulous inflammation, they tend to convey this condition inwards to the substance of the lung itself, through the subserous cellular tissue that separates the lobules, and unites the pleura pulmonalis to the lung. . . . The hereditary nature of the disease must be kept in constant recollection, as well as other diseases with which it is intimately associated, and which are also hereditary in their nature, such as scrofula, gout, rheumatic fever, cancer, and diabetes.”

These then, with other considerations, have induced me to place tuberculosis under this group of diseases. There yet remains ere we close this section, diabetes. It would occupy too much time to review at length the various opinions entertained regarding the pathology of this peculiar disease; and the following quotation from Dr Pavy embraces perhaps all that can be said on this point:—“When sugar and starch are consumed by a healthy person, there is no doubt that they undergo a process of elaboration or assimilation as to adapt them for administering to the requirements of the economy before their elements are discharged amongst the effete materials. In diabetes, owing to the non-performance of the proper assimilative action, although the starch is transformed into sugar, yet the sugar fails to proceed further (*i.e.*, sugar is not further oxidized to form carbonic acid and water). Sugar passing through the liver and reaching the general circulatory system is sure to give rise to its appearance in the urine. From this default in assimilative action, the saccharine element of the food simply filters, as it were, through the body, instead of being retained and administering to its requirements.” On the whole, therefore, there can be little doubt that if sugar could be sufficiently oxidized while circulating in the blood, the appearance of it in the urine would be prevented.*

But I have ventured besides to give expression to a conviction that, apart from the foregoing class of diseases, there is a group to which the term *septicimææ* is applied, whose origin is different, and which presents very dissimilar features. I have assumed, judging from their manifestations, that the pyrexiaë are due to poisons which induce a preternatural activity of destructive assimilation, that the group of diseases I have just left is attributable to autogenetic influences induced by habit of body; and in like manner basing my

* Vide on this subject, Dr. M'Donell “On the Functions of the Liver.”

hypothesis on the manifestations of the *septicæmie*, I infer that in some way or other the peculiar property of their poison is such as to occasion retrograde metamorphosis, and thus act as causes of disease. In this group we recognize scarlatina, diphtheria, cancrum oris or stomatitis, erysipelas, pyæmia, puerperal fever, hospital gangrene, &c. It was a long cherished opinion, and one, if I mistake not, yet propounded, that suppuration is a vital act; that the process of healing could not take place without the occurrence of this intermediate pathological condition, and that what the older surgeons quaintly termed healing by the first intention was a sham and a delusion. Different opinions, and as I believe more correct ones, are now very general. Healing by the first intention or repair, without the supervention of suppuration, is the most perfect form of healing. When suppuration ensues, repair may be said to be effected by a compromise; part of the material which should have contributed to the repair of tissue is thus sacrificed, and the process consequently retarded. Suppuration I conceive to be a morbid process, in its essential conditions, as we shall see, the antitype of oxidation. In further analysis of the nature of the group of diseases under consideration, it will be necessary to review the opinions held regarding suppuration. I submit that as a comprehensive division, suppuration may be either specific or non-specific. In order to the production of suppuration, there must pre-exist a certain degree of inflammatory action; and as its exciting cause, irritation, specific or non-specific, is a necessary antecedent. Now the difference of the specific and non-specific suppuration appears to me to consist in this, that whereas the irritation causing the non-specific inflammation, as in the case of pneumonia, pleurisy, &c., has a natural tendency to, and does, it may not inappropriately be termed, die out by degrees; that causing the purely specific inflammation, and its consequences, as in the case of syphilis, &c., is indefinitely transmitted by the auto-innuculability of the discharges, and its effects thus necessarily perpetuated. The physiological conditions under which suppuration and ulceration exist are thus explained:—When a healthy part is artificially irritated, contraction of the minute capillaries ensues, accompanied by pallor due to the diminution of the quantity of blood, though its current is quickened according to the hydraulic principle that when a certain quantity of fluid is driven through a tube with a certain force, and the calibre

of the tube diminished, the force remaining the same, the current is necessarily quickened. Thereupon the nerves supplying the irritated part become exhausted, temporarily paralysed; the minute blood-vessels, in consequence of the withdrawal of the nervous influence, become preternaturally dilated; the course of the blood is retarded, though its quantity is increased, according to the same law just quoted; and if the inflammation be sufficiently intense, *i.e.*, if the irritation be sufficiently perpetuated, the blood corpuscles ultimately block in the capillaries; after a particular oscillation of the current, liquor sanguinis becomes effused, and concurrently the classic symptoms of heat, swelling, and pain become developed; the latter being due doubtless to pressure on the nervous peripheræ, the former to the increased quantity of blood and effusion. Now, what takes place under these circumstances? The vitality of the part is depressed, circulation and absorption are imperfectly performed, or not at all. The consequences that ensue Dr Bennett enumerates as adhesion, softening, induration, suppuration, granulation, ulceration, gangrene. These several conditions to my mind lapse one into another; and if any distinction can be adopted, I think it ought to be into restorative and morbid; the former comprehending the resolution or organizative results of inflammation, the latter the *dernier ressort* of nature, suppuration or gangrene, and then follows the repair. The vitality of the part is depressed; and how so? There is an interruption to the interchange of elements which necessarily takes place in the normal state of the part, the proper function, as we have seen, of the tissues being their destruction. If the stagnation is perfect, no new tissue is deposited, the effete is not removed by oxidation and absorption, and complete death or mortification of the part ensues, the tissues being resolved to their elementary bodies, sulphuretted hydrogen and other putrescent gases being evolved. But if the stagnation is not complete, only *partial death* ensues, and the part performs its function by a compromise (if resolution does not take place) by throwing off part as pus, and thus enabling repair to ensue. Once more, what constitutes the normal state of living texture? Is it not oxidation, absorption, and free circulation. What is the state of an intensely inflamed part with consequent effusion of liquor sanguinis? Is it not solidification, impaired, if not complete abeyance of absorption, and the same state of the circulation? and *therefore* suppuration and ulcera-

tion. The proposition is therefore justifiable, that suppuration is due to *intrinsic*, and not to *extrinsic* conditions, and bears on what we may have to say on treatment, &c.

Waste of tissue, as we have seen, is supplied by liquor sanguinis, or rather by a peculiar constituent of it, fibrine. Before repair can take place, the effete tissues must be removed by oxidation. Fibrine, by which material repair is effected, develops itself under favourable circumstances into healthy tissue; * “first, by solidifying into an opaquish granular mass, studded with small oval nuclei, which like other nuclei are rendered more distinct by acetic acid: within a certain time the lymph acquires a distinctly fibrous structure, and the nuclei probably arrange themselves into fibres; or, secondly, the fibrine develops itself into a mass of large *nucleated* cells, which subsequently enlarge, elongate, and split into the shapes known as caudate, fusiform, &c.,” and ultimately split up into fibrous tissue. Pus is a yellowish opaque fluid, having a peculiar smell, and consists of thin serum, holding a vast number of globules in suspension. These globules I take to be the unassimilated cells of the fibrine, in a degenerate state, and possibly, as has recently been urged, the extruded blood corpuscles, to some extent. This material, under favourable circumstances, ought forthwith to have been transformed into healthy tissue; but under unfavourable circumstances part must needs be sacrificed. Another portion of the fibrine forms the substance of the granulations, and if the formation of the granulations predominates over the suppuration, the part heals. Pus, due to inflammation from non-specific causes, is bland, has but a slight though distinct odour, and forms an effectual and unirritating protection for the delicate granulations forming so actively underneath; while that arising from specific causes is very dissimilar, being acrid, as a rule inoculable, and consequently perpetuates its irritation, inflammation, and its consequences to adjacent textures. Indeed, it may be submitted as an axiom, that in a direct ratio to its acidity and inoculability, so are the consequences of inflammation prolonged indefinitely. This latter condition is eminently characteristic of the group of diseases under consideration. Diphtheria and scarlet fever eliminating their poison, as I believe by, and inducing thereby excessive and intractable ulceration in, the faucial mucous membrane, cancrum oris in adjacent structures, and hospital

* Paget quoted by Druitt.

gangrene and erysipelas, as a rule, in parts whose vitality has been depressed by surgical interference with disease, while the conditions under which pyæmia originates corroborate the assumption submitted as to its ultimate nature. Let us glance, then, for a moment at the circumstances which favour the origin of these dreaded complications. Foremost among the predisposing causes must be placed overcrowding, disregard of cleanliness, and other insanitary conditions. Overcrowding will destroy the "sweetness" of the atmosphere, *i.e.*, contaminate it, either by surcharging it with an excess of the elements of the effete tissue, as represented in the pulmonary and cutaneous exhalations, or by directly diminishing the quantity of oxygen; and whether or not, it will be admitted that the *materies morbi* of these affections is of a septic nature, and as such counteracts the normal oxidation of certain parts of the body, the theory is practically recognised in treatment, for no sooner does hospital gangrene, erysipelas, or pyæmia make its appearance in a ward, than the surgeon removes his patient to a well-ventilated place, that he may inspire uncontaminated air, and employs remedies capable of evolving oxygen directly, or which possess the property of decomposing such organic matter as may be in circulation throughout the tainted atmosphere, and thus restore the original purity of the atmosphere, and favour the recovery of the patient. Again, diphtheria and scarlet fever originate very frequently simultaneously. They are admitted to be due to miasmatic influences; and in their worse forms they present in common an intractable and unhealthy ulceration of the fauces. In both, albumen is frequently found in the urine, independent of structural changes in the kidney. Scarlatina is not necessarily accompanied by efflorescence, or by noticeable fever. The urine in both diseases is scanty in quantity, and almost invariably contains urates in abundance; and urates, we have seen, are formed by an insufficient oxidation of tissue; while the frequent presence of albumen in this secretion tends to indicate that oxidation is interrupted. Diphtheria and scarlatina reproduce their *materies morbi* in individuals affected thereby, and are thus communicated to susceptible persons who come within the foci of infection.

Besides the presence of urates in the urine, rheumatism and diphtheria seem to present other features in common. In one case of diphtheria, remarks Dr Wade of Birmingham, sudden diminution of the urinary secretion, without albumenuria, was attended by

swelling and pain of the carpal joints (rheumatic?).* “Pyæmia is due,” says Mr Savory, “to the absorption of a putrid or morbid fluid; and tending in a very special manner to the production of such fluid, the following conditions eminently contribute, viz., overcrowding in the close wards of an hospital with its attendant consequences, and such conditions as depress the general vitality or strength of the body, and render it more susceptible to disease.” Infection or contagion from puerperal fever or erysipelas, or inoculation with putrid fluids may likewise cause it. Cancrum oris is, in like manner, induced by debility, and the breathing of a contaminated atmosphere. “Sometimes,” says Druitt, “it is said to commence with the exudation of a pale yellow fibrinous matter, like that exuded in some forms of diphtheria, *with which this disease has the greatest affinity.*” Then a phagedenic ulceration of a most intractable nature ensues. Erysipelas, again, is a specific inflammation, prone to spreading and ulcerating. It is also in a striking manner identified with overcrowding in hospitals as a cause. Some ochletic cause, which if not identical with, is a modification, in all probability, of the poison causing those diseases with which it has affinities so striking. Dr Ferguson states that puerperal fever and erysipelas were generally co-existent in his lying-in-hospital; the mothers perishing of the one, and the infants of the other: and this is an observation which can be amply confirmed by every practitioner in this department. “It seems highly probable,” says Dr Barclay, “that two forms of puerperal peritonitis exist, of which the one corresponds to ordinary inflammation, being only modified by the previous exhaustion of a labour perhaps unusually severe; the other, by far the most common, is the result of suppurative changes in the blood, and presents analogies to erysipelas. It is worth remembering that, as erysipelas and its allied diseases occasionally put on an epidemic character, so also does puerperal fever.”† “The contagion of erysipelas may cause puerperal fever, just as the inoculation of the fluids of a female who has died of puerperal fever is a most fatal source of diffuse cellular inflammation to the dissector.” Those diseases, then, it must be admitted, are in a peculiar manner dovetailed, if the expression be permitted, into one another. They present symptoms in common, they originate under like circumstances, and the means,

* Wade on Diphtheria, *Lancet*, 1862, Vol. IV.

† Dr Ferguson on Puerperal Fever.

as I shall endeavour to point out, by which they are most successfully combated are analogous. Specific inflammation is their generic characteristic; and that inflammation I believe to be due to the elimination, or attempt at eliminating of some septic poison by particular organs or textures of the body. This very summarily disposes of the constitutional diseases with which specific inflammation is identified. We pass to a brief consideration of those diseases induced by local irritation; and they, in like manner, are divisible into specific and non-specific. Of the former, syphilis and gonorrhœa may be taken as examples; of the latter, pneumonia and pleurisy. Gonorrhœa and syphilis are due to the deposition on the affected part of a specific poison, which produces a specific inflammation, in consequence of the irritation of the poison; the irritation, as we have seen, being communicated by auto-innuculability, and the consequence thus rendered indefinite in duration. Gonorrhœa differs from syphilis in its manifestations being purely local; while the poison of syphilis is prone to absorption, and induces constitutional manifestations. Pneumonia and pleurisy, which we have taken as typical of the non-specific inflammations, present this important difference, that their cause is not specific, and that the primary irritation has a natural tendency to wear off or die out, and reaction, if the inflammation be not very intense, is naturally established. The same necessarily holds good regarding specific and non-specific ulcerations. For example, pneumonia is frequently caused thus—A person has been respiring air heated above what might be called the normal temperature; the minute blood-vessels of the lungs are thereby relaxed, and coming abruptly in contact with a much colder atmosphere they are contracted in consequence of the irritation caused by the sudden transition; in turn they become exhausted, temporarily paralysed, reaction ensues, and inflammation may be fairly set in. Cold, as such, does not extend or spread by contiguity as an irritant; but it occasions as an irritant inflammation, and, according to its intensity, local stasis of blood and effusion, whereby absorption and oxidation are interrupted, and carnification may ensue; in due course, it may be, the resolution of the tissues into suppuration, with its attendant ulceration, as in the case of phthisis, from which it differs in its advanced stages only in this, that the source of the irritation in the latter is a product of the body, furnished doubtless by mal-assimilation, while that of the former is extraneous.

Such appear to me to be the sections under which diseases should

be grouped; and the four diseases to which reference has been made, must be looked upon simply as types of such other diseases as can be thus classified. How it happens that, by a certain pathological aberration, diabetes may be caused on the one hand, gout, rheumatism, and scrofula, &c., on the other, I cannot explain; but I am satisfied, if for my own guidance, I have discovered the *direction in which* the peculiarities of causation must naturally be sought. Again, if the views enunciated be correct, nay if they faintly approximate accuracy, then can the *modus medendi* of the principal therapeutic agents employed in the treatment of disease be rationally explained, at least to my mind; but if unfounded, or erroneous, my faith in their efficacy must be diminished, the claims of medicine to be ranked as a science in my eyes compromised, and empiricism seem defensible.

The doctrine of therapeutics, to be correct—to meet the end which the physician has in view in the treatment of maladies hidden from visual observation—must be founded on a correct knowledge of the conditions, or estrangements from healthy action which constitute disease, and on a presumable operation of the modifying influences of our remedial agents. Viewed in the light of the foregoing hypothesis, I purpose briefly to review the treatment of the diseases to which reference has been made in the foregoing pages; and I mean to preface that review with a few remarks on our *materia medica*.

The essential functions of organized life may, I think, for all practical purposes, be referred to two heads, the vital or physiological, and the chemical. Accordingly I have conceived that a comprehensive classification of remedies might be instituted under the heads Physiological, Chemical, Catalytic, and Mechanical. All remedies, it humbly appears to me, must act either chemically, physiologically, mechanically, or catalytically, combining doubtless frequently both actions. The subjoined representation exhibits at a glance the classification which I submit for consideration:—

A.—CHEMICAL.

* Compounds existing in the blood in the condition of health, or capable of conversion into like compounds, which being administered as medicines

* At present I can express this belief only in a general way. Our subject would naturally divide here. The extent to which the individual members of this group so act, as compared with one another, I have not ascertained. The inquiry must be deferred to another time and opportunity.

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modify the proportion of these agents in the blood, and secretions, and act as—

DIURETICS.	STIMULANTS.	DIAPHORETICS.
Carbonate of Potash.	Carbonate of Ammonia.	Acetate of Ammonia.
Acetate of Potash.		Carbonate of Ammonia.
Tartrate of Potash.		Muriate of Ammonia.
Nitrate of Potash.		
Acetate of Soda.		
Colchicum.*		
TONICS.	ASTRINGENTS.	
Iron.	Sulphuric Acid, Lime,	
Lime.	Alum, Iron.	
Nitric Acid.		
Nitro-Muriatic Acid.		
ALTERATIVES.	ANTACIDS.	LITHONTRIPTICS.
Salts of Potash.	Potassa, Soda,	The Antacids, and Acids,
	Ammonia, Lime.	such as Citric, Nitric,
		and Hydrochloric, &c.
REFRIGERANTS.	ESCHAROTICS.	CATHARTICS.
Vegetable Acids.	Potassa.	Sulphur.
Tartaric Acid.	Nitric Acid.	Magnesia.
Citric Acid.	Acetic Acid.	Carbonate of Magnesia.
Sup. T. Potash.	Sulphuric Acid.	Sulphate of Magnesia.
Nit. Potass.		Sulphate of Soda.
		Sulphate of Potash.
		Supertartrate of Potash.
		Tartrate of Potash & Soda.
		Phosphate of Soda.
		Muriate of Soda.

B.—PHYSIOLOGICAL.

Medicinal Agents foreign to any of the constituents of the body, and chiefly derived from the vegetable kingdom, which induce no variation in the proportion of the constituent principles of the secretions or excretions, but act specifically or vitally as—

SEDATIVES or NARCOTICS.	ASTRINGENTS.	DIAPHORETICS.
Alcohol, Digitalis,	<i>Mineral Kingdom.</i>	<i>Mineral Kingdom.</i>
Ether, Tobacco,	Copper, Zinc, Lead,	Antimony,
Prussic Acid, Lettuce,	<i>Vegetable Kingdom.</i>	<i>Vegetable Kingdom.</i>
Camphor, Stramonium,	Quercus Robor, and	Opium, Camphor,
Opium, Arnica,	Infectoria,	Guaiacum, Daphne,
Hyoscyamus, Hop,	Tormentilla, Hæmatoxylin,	Ipecachuan,
Belladonna, Strychnine,	Uva ursi, Catechu, Kino,	Sassafras,
Aconite, Cannabis Indica,	Rhatany, Copaiba, Tur-	&c.
Hemlock, Cocculus Indica,	pentine,	
Conium, &c.	Cubebs, Gallic, and	
	Tannic Acids,	
	Buchu, Pareira Brava,	
	Uva ursi, &c.	

* Though from the vegetable kingdom may be classed here.

ANTISPASMODICS.

Animal Kingdom.

Musk.

Castor.

Vegetable Kingdom.

Assafoetida.

Valerian.

Sagapenum.

Galbanum.

Camphor.

STIMULANTS.

Ether, Alcohol. (*No other pure stimulants. Many of the Narcotics are primarily stimulants.*)

EXPECTORANTS.

Antimony, Ipecachuan, Squill, Senega, Balsam of Fern and Tolu, Myrrh.

DIURETICS.

Squill, Digitalis, Tobacco, Solanum Dulcamara, Lettuce, Senega, Broom, Juniper, Copaiba, and the several varieties of Pine.

CATHARTICS.

Senna, Rhubarb, Jalap, Croton Oil, Colocynth, Elaterium, Aloes, Scammony, Gamboge, (and Mercury from *Mineral Kingdom.*)

EMETICS.

Mineral Kingdom.

Antimony, Copper, Zinc.

Vegetable Kingdom.

Ipecachuan, Squill, Tobacco, Mustard.

TONICS.

Zinc, Copper, Cinchona, Calumba, Quassia, Gentian, Cascarilla, Canella, Anthemis.

EMMENAGOGUES.

Aloes, Savin, Rue, Ergot.

ALTERATIVES.

The Tonics may be considered the Alteratives of this group.

C.—MECHANICAL.

Medicinal Agents acting by direct contact, and act chiefly as—

ANTHELMINTICS.

Tin, Cowhage, Iron Filings, Male Fern.

DEMULCENTS.

Gum Arabic, Linseed, Oils, &c.

DILUENTS.

Water.

D.—CATALYTIC.

Medicinal Agents which effect changes in the living body, without being in themselves changed, and act chiefly as—

ALTERATIVES.

Mercury, Arsenic, Iodine, Bromine.

Such constitute at least a fair selection of the most important of our remedial agents—in short, our *materia medica*, or if you will, our *armamentaria medica*. I have briefly passed in review the conditions constituting, or compatible with health. I have endeavoured to indicate estrangements from healthy action, and to identify certain errors of nutrition with particular diseases, and then having submitted for consideration a classification of the materials, so to speak, with which we are wont, as we believe, to modify, to prevent, or to remedy those aberrations from health which constitute disease,

we pass to enquire why it is that in particular cases certain remedies are selected—in short, to consider whether there exist more rational data for the guidance of the physician than routine and empiricism.

It must be admitted that in no science, *as a rule*, are the higher functions of the mind, the reasoning faculties for instance, less exercised than in that of medicine; not that it does not present sufficient scope for the highest intellect to grasp, not that there are few knotty points to unravel; but certain circumstances conspire to make it a matter of indifference to the practitioner whether he reasons or not. He may too frequently exclaim in the words of Solomon, “If it befall to me, as befalleth to the fools, why should I labour to be more wise?” And what are those circumstances? First, and most important I believe, the natural tendency of all diseases to recovery, despite injudicious interference; and thus under particular circumstances the recoveries of the empiric may contrast favourably with that of his painstaking scientific brother. Frequently the empiric lays the “flattering unction to his soul” that his appliances have determined the cure, while they may have retarded it. “Of all things,” says Bacon, “that nature has created, the human body is most capable of relief, though this relief be the most liable to error. For as the subtilty and variety of the subject affords many opportunities of cure, so likewise a great facility of mistake. And, therefore, as this art, especially at present, stands among the conjectural ones, so the inquiry into it is to be placed among the most subtile and difficult. . . . The subject being so variable has rendered the art more conjectural, and left more room for imposture. . . . The lawyer is judged by the ability of his pleading, not the issue of the cause; the pilot by directing his course, and not by the fortune of the voyage; whilst the physician and statesman have no particular act that clearly demonstrates their ability, but are principally censured by the event; which is very unjust, for who can tell, if a patient die or recover, or a state fall into decay, whether the evil is brought about by act or by accident? Whence imposture is frequently extolled and virtue decried.”

It was a remark of our celebrated countryman, Cullen, that “there are more false facts current in the world than false theories”; and false facts, I believe, are the basis of all imposture, and the salve for indolence and empiricism. The credulity of the human mind is boundless. People under the excitement of a medical panic are easily made to believe that they see beneficial results when none

exist, or when existing not strictly speaking as results. In consequence of the operation of the *vis medicatrix naturæ*, coincidences obscure the judgment so palpably, that very cogent reasoning is requisite for the deduction of truth.

“In the practice of medicine,” says Dugald Stewart, “there are a variety of other circumstances, which abstracting from any suspicion of bad faith in those on whose testimony the credibility of facts depends, have a tendency to vitiate the most candid accounts of what is commonly dignified with the title of *experience*. So deeply rooted in the constitution of the mind is that disposition on which philosophy is grafted, that the simplest narrative of the most illiterate observer involves more or less of hypothesis; nay, in general it will be found that, in proportion to his ignorance, the greater is the number of conjectural principles involved in his statements. A village apothecary (and, if possible in a still greater degree, an experienced nurse) is seldom able to describe the plainest case without employing a phraseology of which every word is a theory; whereas a simple and genuine specification, unsophisticated by fancy or by preconceived opinions, may be regarded as an unequivocal evidence of a mind trained by long and successful study to the most difficult of all arts, that of the *faithful interpretation* of nature. Independently, however, of all these circumstances which tend so powerfully to vitiate the *data* whence the physician has to reason, and supposing his assumed facts to be stated, not only with the most scrupulous regard to truth, but with the most jealous exclusion of theoretical expressions, still the evidence on which he proceeds is, at best, conjectural and dubious, when compared with what is required in chemistry or mechanics.” Thus wrote one of the greatest thinkers our country has ever produced, regarding the theory of medicine. And well may its difficulties be admitted. Yet there is an endeavour on the part of almost all medical practitioners to show that they make use of their observing faculties, and that they have arrived at certain conclusions; in general, however, with an enviable facility, and too frequently the *data* on which these conclusions are founded are *false facts*. Thus, an intelligent practitioner insisted to the writer that *serpentaria* was a most valuable medicine in typhus fever. Now we could never be led to the employment of *serpentaria* in typhus by inductive reasoning: but this gentleman may just have used the medicine in a case that got well speedily; he forthwith conceives the idea that the drug has a beneficial effect

in typhus, he uses it in his next case, and so on perhaps for a brief succession of mild cases that may have recovered, and then his preconceived idea becomes a settled belief. This is the fallacy of coincidence, the most important by far in medical reasoning, and to which I have referred above. But how do we get rid of it? We know, or should know, what the mortality of all diseases would be uninfluenced by treatment; and if a much greater per centage recover under a particular treatment, other things being equal, we are forced to the conclusion that to this particular treatment is the diminished mortality to be ascribed. From a few cases no inference can be deduced; but the greater the number of cases with which we have to deal, the more does the fallacy become invalidated. Another objection to the reliability of medical statements is the slipshod manner in which conclusions are arrived at. Many seem to get through uncertainties *per saltum*; there is no such thing as an attempt at reasoning with them. And again, superbly fine discriminations are instituted between diseases, in the chaos of which broad principles are entirely lost sight of. For instance, to quote from a somewhat recent number of the *Lancet*, a gentleman had been writing on gouty bronchitis, if such a disease ever existed, and he relieves himself of the following:—"I have placed Dr Greenhow's heading, 'On Gouty Bronchitis,' at the beginning of these remarks, more out of courtesy to him than as a fit index to these observations; for whilst I am persuaded that I have met with several cases of rheumatic bronchitis, some of which were of a rheumatic gouty character, I have not seen bronchitis caused or associated with gout." One feels much inclined to use strong language while descanting on such statements. In the first place, no one has a right to encroach on an already too cumbrous nosology, under the shadow of any name, however great. Again, if there is any man in the kingdom who, unaided by a luxuriant fancy, can, by appealing to common sense and reason, distinguish between rheumatic-bronchitis, and rheumatic-gouty-bronchitis, and gouty-bronchitis, and simple bronchitis, I would be among the first to do him homage, and admire the perfection of his discriminating talent! But we live in an age of wonder. Again, you are daily met by men who profess such a predilection perhaps for one preparation of iron over another,—prefer belladonna to hyoscyamus, calumba to gentian, chloride of arsenic to the arsenite of potash, acetate to the muriate of morphia, and so on. Each sees, or rather fancies his discriminating

mind is observant of differences in action and medicinal value. To this class belong, to quote once more from Dugald Stewart, "those who are perpetually declaiming against the uncertainty and fallacy of systems, are themselves employed in amassing a chaos of isolated particulars, which they admit upon the slenderest evidence. Such men, sensible of their own incapacity for scientific investigation, have often a malicious pleasure in destroying the fabrics of their predecessors; or if they should be actuated by less worthy motives, they may yet feel a certain gratification to their vanity in astounding the world with anomalous and unlooked-for phenomena." One principle, one incontrovertible axiom, is worth a thousand of these isolated particulars or false facts in advancing a science. They are the remnants of a mediæval credulity, which like the frost work of an autumnal morning, must dissolve, vanish, and leave not a wrack behind.

Turning from what may seem a rather lengthy digression, we proceed to consider whether, in accordance with what has been advanced in the foregoing, many known facts may not be generalised, and apparent anomalies reconciled. We have considered the condition of health to be a due and harmonious performance of the functions of histogenesis and histolysis; have expressed the opinion that diseased conditions may arise from, or be traceable to three fundamental aberrations from the state of health; 1st, An abnormal determination of histolysis; 2nd, The reverse, or an insufficient oxidation of effete tissue; and 3rd, The morbid changes due to specific or non-specific irritation. Fever, in its widest sense, has been classified under the first head, being essentially an abnormal breaking down of the system, evidences of which we recognise in the marked increased density of the urinary secretion, increased temperature, in some cases profuse perspiration, and the very rapid emaciation. Now, with these conditions for our guidance, conditions which it will at once be conceded are the essential phenomena of the febrile state, what are the rational indications of treatment, and of what means are we in possession to avert the tendency to death? Dr Parkes observes, with reference to treatment—"To insure proper excretion in fever it is much more difficult than to reduce temperature, which latter condition, for obvious reasons, it is not always wise to attempt." And to insure this proper excretion, Dr Parkes suggests "to supply the system with an abundance of alkaline salts,

which are not now given in the food. Chloride of sodium, and the alkaline salts of potash, and probably also that of soda, tend to aid the promotion of urea, and its elimination." Now, with every deference, I humbly submit that, in the light of what has been advanced regarding the pathology of fever, the opposite course is indicated. Dr Parkes himself speaks thus—"The body loses flesh rapidly, owing not only to diminished ingress of food, but also to increased egress of bodily structures in the form of excretory products. The metamorphosis of tissue, as judged by the urine, is augmented." Now, though at the risk of a little recapitulation, observe that I have attempted to show that there is excessive oxidation in fever; that urea results from the oxidation of nitrogenized tissues; that its quantity is, *as a rule*, much increased in fever, and in the classification of remedies, I have placed the alkalies under the chemical, knowing that all the alkalies and alkaline carbonates promote oxidation, and that the vegetable acids, such as citrates, tartrates, mallates, &c., are converted into carbonates in the system for this express purpose. I would, therefore, ask, if this practice, which seems to me too much to savour of the heresy of homœopathy, is scientific, or tenable? Is it proper to add fuel to a fire that is manifestly burning quickly towards the destruction of the fabric? Would it not appear the rational treatment to prevent, if possible, this excessive combustion; and if not possible, to compensate for it during the particular time that the fire must burn, to carry out the analogy. And how can this be accomplished? There is no known remedy that will cut short a fever. Its course is definite, inevitable; but we possess means to compensate for this destruction. We have seen that an augmentation of urea in the urine represents a corresponding degradation of nitrogenous tissue, and thus we are naturally led, in all such cases, to administer a nitrogenous in preference to a non-nitrogenous diet. To arsenic, the following important properties have recently been ascribed, viz., that it prevents, or tends to diminish, the metamorphosis of tissue, and that in consequence it reduces the heat of the body. If that be the case, surely this agent ought to have a fair trial in the treatment of fever. To coffee, the same property is ascribed, and it therefore may be indicated on like grounds. We give properly in fever, beef-tea, milk, &c., and when stimulation is required we give alcohol in some form or other. I believe that the administration of alcohol in fever diminishes the temperature, and thus modifies excessive waste, or *vice versa*. The

diminution of temperature may not at first sight be apparent. The primary effect of alcohol is that of a stimulant; its secondary, if the dose is sufficiently large, is narcotic; and the feeling of warmth which it imparts to the body is not due to an elevation of temperature, but to a dilatation of the capillaries, whereby the amount of blood in them is augmented when its narcotic effect comes into operation. And might it not be suggested that the beneficial results, if any, from the so-called restorative treatment of pneumonia may have some connection with the narcotic influence of alcohol, and consequent dilatation of the capillaries, and that the methods of treating by bleeding and by alcohol may not be so antagonistic as at first sight appear. Keeping these indications in view, I have found fever (I can speak only of enteric) a very mild disease. In an epidemic of enteric fever, reported in the *Lancet* for 1863, of which I treated above 35 cases, by the administration simply of beef-tea, and such nitrogenous diet, with wine when deemed necessary, but one death occurred. I am sure I am within the number in stating that during the last few years I have treated fifty cases of enteric fever, with but *one* death; and I am constrained to the belief that this simple and, as I conceive, rational treatment, must have contributed to the satisfactory result. Beyond a gentle laxative at the commencement, the application of sinapisms to the abdomen, and the administration of nutriment as above, the cases were left to nature. I may mention that in certain cases I recognise the propriety of treating the local manifestations in the bowels on the antiphlogistic method. Leeches may, I think, be applied with benefit, and blistering employed subsequently. But these observations must suffice under this head. Next in order comes the group which I have ascribed to an insufficient oxidation of effete tissue, and inadequate elimination. Under this group I have recognised two orders, as may be remembered, the first comprehending gout, rheumatism, neuralgia, oxaluria, calculous diseases, and scrofula; the second, scarlatina, diphtheria, cancrum oris, erysipelas, pyæmia, &c.

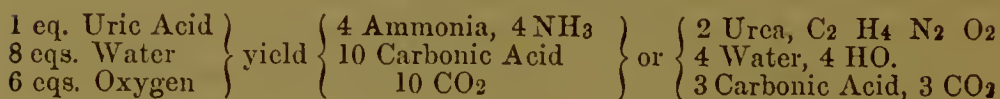
Reverting to what has been adduced regarding the pathology of these diseases, we have seen that urea, carbonic acid, water, and the several salts of the urine represent the waste of tissue, that uric and hippuric acids exist only in very small proportions in healthy urine, if indeed they exist at all in perfectly healthy urine. Urea represents the full oxidation of effete tissues, while oxalic and lithic acids are intermediate products—products that have not been raised

to the full oxidation. "When uric acid is so formed in warm blooded animals it must," says Gregory, "be further oxidized so as to yield soluble compounds, or else by its insolubility it is deposited, as in the cases of gout and calculous diseases, when it is deposited in the forms of urate of soda and urate of lime." The results of the less and more complete oxidation are thus shown by Dr Gregory, as we have already seen:—

LESS COMPLETE OXIDATION.



COMPLETE OXIDATION.



Now, let it be remembered that the products of the less complete oxidation are believed to be the *materies morbi* of certain forms of disease—lithic acid of gout and rheumatism, oxalic acid of oxaluria, and both lithic and oxalic of certain calculous disorders. Observe, further, that the circumstances under which those peccant compounds are produced are those that obtain, as we have seen, at p. 16, in the cases of patients thus affected, sedentary habits, excessive indulgence in highly nitrogenous food, &c. "When," says Liebig, "the vital force in the albuminous tissues is no longer able to resist the chemical action of the oxygen which is conveyed to them in the arterial blood, it combines with their elements, and forms products among which uric acid is the most important. But if sufficient oxygen and water be conveyed into the arterial blood, the greater part of the uric acid, or more insoluble salts is converted into urea, and carbonic acid; so that the effete nitrogenized elements of the tissues reach the emunctories in a soluble form, a condition necessary for their ready secretion. Hence the more oxygen enters a tissue during its disintegration, the more complete will be the conversion of the insoluble uric acid into the soluble urea, and the more easy its elimination from the body. Consequently in all diseases where uric acid, or its compounds, form the *materies morbi*, the rational indication of treatment is to supply oxygen for the purpose of raising such compounds to urea, preventing their formation thus, and

favouring the elimination of the exponent of the nitrogenized elements from the body. That must be conceded.

The same equally applies to oxalic acid. It is also an adventitious, sub-oxygenated product. We have already adverted to the interdependence of oxalic upon uric acid (*vide* p. 35). Now, if this be the pathology of those diseases, if the above is the rational indication of treatment, how is the oxidation of lithic and oxalic acids to be accomplished? Experience and observation have already pronounced in favour of the alkaline treatment of gout and rheumatism. And why should the alkalies act beneficially? The alkaline carbonates, we have seen, favour oxidation, and the vegetable acids are converted into carbonates in the system for a like purpose. In a word, the alkalies cure gout, rheumatism, and neuralgia, by oxidizing their *materiæ morbi* to the condition of a perfect excretion, and thus do not neutralise the acid as some believe, *but entirely prevent its formation.*

But we turn to another remedy which enjoys no mean reputation in the treatment of those diseases—lemon juice, the chief constituent of which is citric acid. This remedy was introduced by Dr Owen Rees. The composition of citric acid is $C_2 O_4 H_2$. This shows a great excess of oxygen over and above the quantity required to saturate the hydrogen. Regarding the employment of citric acid in those diseases, Dr Inman of Liverpool thus writes—"For my own part, after close attention to the subject, I have never been able to satisfy myself that the sour smell has diminished under the use of alkalies so rapidly as it does when lemon juice alone is employed. In the treatment of acute rheumatism it is necessary to see that the patient has good lime juice and plenty of it. If we find, as I have done, that the average duration of rheumatism, under unlimited administration of lime juice, is about ten days, while the average duration of cases treated on the eliminant or alkaline plan exceeds that period considerably, *we may conclude that the success of the alkaline plan cannot be adduced as a proof of the soundness of the theory on which it is based.*" Now, I shall not dispute Dr Inman's opinion as to the comparative value of alkalies and lime juice; but I demur most decidedly to his conclusion that the success of the lime juice treatment is a proof of the unsoundness of the theory on which the administration of alkalies is founded. If it is conceded that lithic acid is a sub-oxygenated product, that the *citrates*, *tartrates*, and *mallates*, are converted into carbonates in the blood, that carbonates greatly

promote oxidation, then the conclusion of Dr Inman is visionary, and the success of the lime juice treatment *favours* the lithic acid theory.

Again, Dr Rees informs us that "cases are quoted by Percival, from which it would appear that calculous diseases have been greatly benefited by the use of lemon juice; so much so indeed as to have led to the belief that it possessed lithontriptic properties. Sydenham also recommended lemon juice and manna as a remedy for gravel, and speaks of its great efficacy in his own case; and he relates how his nephritic affection formed the sequel of an attack of gout. The probability that the beneficial effects quoted by the authors cited were produced by lemon juice is to a certain extent increased by the experience we have had in rheumatic diseases, stomach derangements, disturbance of the function of the heart, and calculous nephritis, all bearing a relation to the rheumatic and gouty diathesis."

But there is another remedy which deserves special mention, and of whose efficacy in gout and rheumatism it is impossible to speak too highly; I mean iodide of potassium. Of it, Dr Chambers in one of his clinical lectures writes as follows:—"The employment of iodide of potassium is purely empirical. By none can the fact be explained that this remarkable substance restores their normal functions to several tissues, most notably to those sparingly supplied with blood-vessels, such as cartilaginous, and white, hard fibrous parts, the periosteum, the sheaths of tendons and of nerves, the hair, the nails, and outer layer of the skin. On these grounds it is employed when rheumatism and even gout attack the tendinous and internal tegumentary parts of the joints and limbs. And I think one cannot doubt the assurance of the sufferers that they feel the better for it, however inexplicable the fact may be." In the light of the views I have endeavoured to advance, I object to the charge that the employment of iodide of potassium is, in these cases, empirical. Iodine and its compounds act, in all cases, favourably, when disintegration is tardy, by their action on the absorbents; and if, for the reasons above assigned, disintegration is tardy and imperfectly performed in those diseases, have we not a reasonable explanation of the beneficial action of this important drug?

But, further, I have included under this group scrofula and its manifestations; and we proceed to enquire whether what has been adduced regarding its pathology can throw any light on the therapeutics of this important disease. The opinion has been advanced,

and it is one very generally held by high authorities, that tubercle is one of the numerous products of retrograde metamorphosis, or of imperfectly accomplished nutrition. The blood is loaded with nitrogenized elements, the urine contains much less urea than in health, the lymphatics are primarily affected, absorption seems to be imperfectly performed, and thus perverted nutrition, as we have seen at page 18, engenders tubercle. We have adduced reasons why we believe oxidation to be imperfectly performed. And what then are the remedies most successfully employed in the treatment of this class of ailments? In the order of their popularity, so to speak, may be enumerated, cod-liver oil, iodine, with its combinations, iron, nitro-muriatic acid, and mercury—a drug which, to not a few, it seems perfectly heterodox to mention in connection with scrofula. Now, it humbly appears to me that the benefit which unquestionably results from the employment of cod-liver oil may be thus explained: it modifies this perverted nutrition by the property, common to all oils and fats, of oxidation; thus it helps to assimilate the excessive amount of nitrogenized elements in the blood, stimulates absorption by presenting to the absorbents sufficiently elaborated excretions, and consequently increases the quantity of urea in the urine. The combinations of iodine, it is well known, act in a special manner on the absorbents; and if they do not accomplish the reabsorption of tubercle, we can easily conceive how at all events they will prevent its further deposition. The same applies to nitro-muriatic acid; which also, as we shall see hereafter, acts in a special manner on the lymphatics. But of all medicines that act on the lymphatics, mercury possesses this property in the most eminent degree. Accordingly there have not been wanting great authorities who recommend and employ it in the treatment of scrofulous affections,—of whom may be enumerated, Stokes, Graves, Munk, Corrigan;—and regarding its employment in phthisis, an able writer in the *Stethoscope* writes thus: —“Our experience, as it increases day by day, convinces us more and more that the proximate element of scrofula and tuberculosis is an excess of waste matter in the blood; and whether it (mercury) is expected to assist the elimination of effete matter from the circulation, or in a more undefined manner to prevent its production, mercury seems to us to have a *prima facie* claim to our consideration.” But let me not be supposed to advocate the indiscriminate use of mercury in phthisis; for, like all remedies capable of doing good, its injudicious employment may do much evil. But as the discussion

of the conditions in which it may be beneficially administered in phthisis does not come within the scope of these observations, I must refer for further information to the writings of Munk, Graves, and other authorities. Certain it is, however, that from what we know of the action of mercury, its particular action on the lymphatic system, and the state of the blood, &c., in scrofula, there are strong *a priori* reasons why it should be administered in suitable cases.

Iron and its different preparations have also their advocates. With regard to iron it may be remarked, that it seems to favour the formation of red corpuscles in the blood; that the red are the destructive or histolytic portion of the blood, the white the constructive or histogenetic; that the red seem to attract the oxygen from the air, and that the greater their amount in the blood, the more complete will be the conversion of effete elements.

Diabetes has likewise been consigned to this category of diseases; and with reference to its therapeutics it may safely be asserted that of few diseases is the treatment so unsettled. Cod-liver oil has been recommended by Bernard; and M. Guyot-Dancy, believing that diabetes arises from imperfect combustion of the glucose in the blood, employs citrate of soda, to afford the alkaline carbonate which is necessary to the progressive chemical change in the glucose; and of late the peroxide of hydrogen has been found very successful, acting, doubtless, in the same manner that the citrate of soda does, and as we might expect the other remedies of this class to act. On the whole it seems highly probable that sufficient oxidation promotes the assimilation of sugar, and thus tends to prevent, or cure diabetes.

But once more, we have to consider yet another group of diseases, comprehended, as I believe, under that class of diseases due to insufficient oxidation of effete tissue; but differing from the foregoing in that I take this group, viz., scarlet fever, hospital gangrene, diphtheria, erysipelas, cancrum oris, pyæmia, and puerperal fever, to be due to the introduction of some morbid agency into the blood—not an intrinsic cause, as in the case of rheumatism, gout, oxaluria, &c. I have referred to the circumstances under which the diseases under consideration occur; overcrowding being admittedly their most frequent cause, whereby, to use the language of Mr Savory, “there is an undue accumulation of retrograde metamorphosis in the blood. There is,” continues Mr Savory, “I think, ample evidence to

show that these substances are prone to change; and it is not unreasonable to believe that a decomposing substance introduced into the blood may give a different and abnormal direction to these matters, which, being already in a state of retrograde metamorphosis, are probably least able to resist their influence. There remains the fact that the mischievous properties of putrid substances may be destroyed by rapid oxidation. It has been clearly shown, for instance, that the efficacy of charcoal in counteracting putridity is not due to any power of arresting, but to its power of promoting oxidation. Now, amongst the agents of this class the alkalies occupy a conspicuous place." And if it be conceded, as I have fully endeavoured to point out (p. 23), that there are good grounds for believing that in the Septicæmiæ, such as scarlet fever, hospital gangrene, &c., whose *indoles* is towards putridity; I say, if it be admitted that there are good grounds for assuming that the blood contains an excess of material in a state of retrograde metamorphosis, material, in short, imperfectly oxidized, and if putridity is counteracted by oxidation, have we not a rational explanation of the good effect of such agents in the treatment of these affections? I may here state that I incline to look upon the terms *suppuration* and *decomposition* as synonymous. Suppuration is a decomposition; but decomposition may be something additional. The one, the *species*, comprehends the *genus*. Decomposition is a more complete resolution of the part to its ultimate elements, when death takes place throughout its entire thickness, as in gangrene, or when the part is completely severed from living textures. It is vitality that prevents our entire bodies from decomposition; and to the extent that any part of the body is deprived of its vitality, to that extent does decomposition ensue. Of late the germ theory of decomposition has engaged, to a greater extent than its soundness merits, professional attention; and a mode of treatment, based upon it, has found an enthusiastic advocate in the Professor of Clinical Surgery in the University of Edinburgh. For the prevention of suppuration, which is but a *stage* of decomposition or putrefaction, Mr Lister has strenuously advocated the application of carbolic acid to wounds, in order to kill sporules; but as suppuration can take place in situations to which germs can have no access, carbolic acid, if it at all prevents suppuration, must do so through some other effect; and it is not clear why, if one part of the process of decomposition can take place without the agency of sporules, the other should not. Accordingly

it is an admitted fact, "that flesh protected from infusorial germs is capable of gradually acquiring taint when in small volume, and of becoming 'gangrenous' when in larger masses;" and what may once take place, can surely occur at any other time under like conditions. On the other hand, suppuration, or further decomposition, *never occurs except in conjunction with the pathological states described above.* That infusoria or sporules are occasionally found in certain specimens of pus is not denied; but that they occur as causes of suppuration or putrefaction is what I dispute, following the high authority of Liebig, who writes thus—"The ultimate products of decay and putrefaction are carbonic acid, ammonia, and water. In order to comprehend the process by which this conversion is effected, it is requisite to be acquainted with the intermediate compounds formed by the elements. But so far as the process itself, chemically speaking, is concerned, *it is quite indifferent whether or not*, before assuming the final state, they take on the form of fungi or infusoria. These plants and animal organisms are not the intimate causes of conversion; they are, on the contrary, simple intermediate means of transforming putrid substances. They live upon certain of their elements, and exude excrementitious matter; increase in size to a certain point, die, and are themselves resolved into the ultimate products of decay." But not content with ascribing to carbolic acid the property of preventing suppuration and decomposition by *killing sporules*, Mr Lister lays down certain rules in accordance with which this application must needs be employed; and clearly, to the extent that he does so, he renders his hypothesis the more improbable. Mr Lister calls those, *antiseptic principles*, and thus the ancient one, exclusion of air, is pressed into new service. *Inter alia*, I endeavoured to show in the *Lancet* for October, 1869, the fallaciousness of this doctrine, and my objections remain unrefuted. To one of my propositions I take the liberty of alluding here; for in certain medical circles what has proved "to the Greeks wisdom," has been "to the Jews a stumbling-block":—

"That in the application of carbolic acid by Mr Lister there apparently underlies some mystery, for Mr Lister himself makes the following remarkable concession:—'Any one using carbolic acid as a *remedy*, without reference to antiseptic principles, *will be sure to meet with unsatisfactory results*, whether here or elsewhere.' Let others render these statements as they may, I believe that if carbolic acid is an antiseptic, it will, like all other antiseptics, act antiseptically."

tically, no matter how applied ; for *they* make the principles, not the principles *them*." In other words, I contend that when an antiseptic property can *only* be produced by a certain method of application, it is the method of application, and not the agent, that can be called antiseptic. I am satisfied, then, in common with so many others, that Mr Lister's theory and treatment are not based on correct scientific deduction.

To recapitulate: The septicæmiæ are due to the circulation of material in a state of retrograde metamorphosis in the blood—septic material; putridity is counteracted by oxidation, hence the employment of oxidizing agents in these diseases. But do these theoretical considerations accord with experience and observation? I think they do most decidedly.

To the third class of diseases, the inflammatory, I have ascribed as their cause, irritation, specific or non-specific ;—the specific, as I believe, giving rise to intractable ulcerations in the group of diseases with which I have identified it, in virtue of the auto-innuculability of the discharge ; the irritation, with its consequences, being thus indefinitely perpetuated ;—the non-specific inclining rather to die out gradually, and its effects thus to pass away spontaneously ; the former having a long and indefinite existence, and requiring to be cured ; the latter seldom protracted, having a curative inclination, and requiring for its treatment only cleanliness. This irritation, as we have endeavoured to point out above, causes suppuration—first, by blood stasis, whereby the tissues are not sufficiently supplied with pure arterial blood ; secondly, by preventing in this manner the natural transformation of tissue into carbonic acid, water, urea, &c. ; thirdly, by suspending the function of absorption. This, then, is the condition of an inflamed part, be the irritation specific or non-specific ; and what is to be done in order to restore the part to its normal state? We must first allay the irritation, cut off the supply of the inflammation, so to speak, then we relieve tension, thus permit a free circulation and disintegration ; and this being done, absorption should be stimulated. In the case of the non-specific irritation, the relieving of the tension may be sufficient to cause recovery ; but the case is entirely different with the specific. Is scarlet fever, with its specific ulceration of the throat, due to the circulation of septic matter in the blood? Then we administer chlorinated mixtures, chlorate of potash, tincture of the muriate of iron, all of which are powerful indirect oxidizers. As a rule, the chlorides

act as oxidizers by decomposing the water of the tissues, and thus liberating nascent oxygen. The chlorate of potash possesses a great advantage over the simple chlorides, in being a more powerful oxidizer in consequence of the greater amount of oxygen incorporated with it.

Then if we have a specific, auto-innuculable, suppurating surface, as in scarlet fever, if the irritation and its pathological consequences are thus indefinitely perpetuated, then oxidizing agents brought into contact with such surface facilitate the due degradation of tissue—prevented, as we have seen, by capillary stagnation, &c.,—thus stimulate absorption, make place for the new tissue by restoring the cycle of changes which constitutes normal function, and thus call into existence a healthy action. But it may be urged, that the cause is constitutional, this merely a local manifestation, or a vicarious elimination possibly. True; but if those diseases are engendered by septic material circulating in the blood, the oxidizing agents, in virtue of their property as oxidizers, destroy alike the *fons et origo mali* and its local manifestations. Is hospital gangrene due to overcrowding, and the consequent generation of some septic poison affecting a part whose vitality has been depressed by surgical interference with disease? Then we remove the patient to a pure atmosphere: nitric acid, one of the most potent of oxidizers, is applied to the diseased surface, or charcoal, permanganate of potash, or chloride of lime, &c., all oxidizers; while internally, sulphite of potash is had recourse to, the administration of good food is enjoined, and perchance the ward may be “disinfected,” to use the common term, with chloride of lime, permanganate of potash, &c. Does diphtheria present analogies to scarlet fever? Has cancrum oris the greatest affinity with diphtheria? Has diphtheria affinities with erysipelas? and erysipelas, again, with puerperal fever? Is pyæmia due to overcrowding and septic influence? Is there proof that these diseases are due to the introduction of septic material into the blood? Is it true that the poisonous properties of septic matter may be destroyed by oxidation? Then, does it not strike one forcibly that the remedies most successfully employed in the treatment of these diseases are all oxidizers? It is sufficient to mention chlorate of potash, tincture of the muriate of iron, Condyl’s fluid, charcoal, hydrochloric acid, sulphite of potash, chloride of lime, &c.

Now, a word or two as to the nature and treatment of local specific ulcerations. As examples of this class I have selected

gonorrhœa and syphilis. A chancre I look upon precisely in the same light that I do the throat affection in scarlet fever, with this important difference, that the order of sequence is exactly reversed. The former is due to the deposition on the affected part of a poison which may contaminate the system through the lymphatics; the latter to a system-contaminating poison acting locally. The treatment of chancres is also divisible into local and constitutional. If what has been advanced regarding the pathology of specific ulceration in general be correct, then can I understand why a certain class of medicines should cure syphilis. What then are, first, the local applications from which benefit is derivable? They are black-wash (suboxide of mercury), nitric acid, calomel vapour, Condyl's fluid, chloride of zinc; and I may mention an application which I have found eminently beneficial, a combination of bichloride of mercury with chlorate of potash. Among these remedies will at once be recognised oxidizers, and agents, the mercurial, that act by stimulating absorption. Chlorate of potash I believe to be one of the most powerful oxidizers of the group. It is supposed to act thus—When applied to a suppurating surface, *e.g.*, the chlorine of the salt unites with the hydrogen of the tissues, and one equivalent of oxygen is thus liberated, while the six remaining equivalents of the salt are also set free, both in a nascent condition, and consequently more potent. Thus do these agents oxidize, stimulate absorption, and call into existence a curative action. In like manner gonorrhœa, though a purely local, specific inflammation, is equally amenable to treatment. That astringent medicines, which I have included under the physiological agents, do cure inflammations, I do not dispute; but they cure in a different manner from the disinfectants or oxidizers; they act beneficially by the forcible extrusion of the blood. In this manner sulphate of copper, sulphate of zinc, tannin, nitrate of silver, and acetate of lead, may be supposed to act.

For the chloride of zinc important claims have been urged by Mr de Morgan, viz., “those of promoting healthy action and preventing decomposition in wounds, and its influence in preventing erysipelas and pyæmia.” In the *Lancet* for November, 1866, I have asserted that these properties were neither of recent discovery, nor practically of recent application, and to this assertion I still venture to adhere; and in proof of which I instanced the well-known properties of chloride of zinc in the cure of gonorrhœa; and its effects in that disease, in the very words of Mr de Morgan, I admitted to be

“those of promoting healthy action and preventing decomposition,” believing, however, that it does so by stimulating absorption, and by oxidising. The same may be said of the other disinfectants mentioned.

But constitutional treatment is essential to the cure of syphilis; and of the remedies so employed the following are the most important—the preparations of mercury, iodide of potassium, nitro-muriatic acid, iodine, the chlorides, and the chlorates, and we might include the preparations of potash generally. Now, what is their generic action? Is there impaired absorption in the case of specific ulcerations, in the hard chancre, for example? All these medicines act beneficially when disintegration is tardy; they stimulate absorption; and act with reference to local treatment as a *vis a tergo*. That they do act in this manner is amply shown by their common effect on the secretory apparatus; in the case of the salivary glands, causing ptyalism; in that of the liver, an increased secretion of bile; of the schneiderian membrane, an increased secretion of mucous; and in the reduction of abnormal enlargements of the glandular system by increasing its activity. The beneficial effects from the stimulating of absorption are further illustrated in the application of blisters to indolent sores; and in the excellent results that follow strapping, and the horizontal position in the treatment of varicose ulcers in particular. What is a varicose ulcer? A partial death of a portion of the body whose vitality has been depressed from want of sufficient circulation, and this in consequence of static effusion into the cellular tissue, owing to muscular debility in the veins, whereby dilatation of their calibre ensues, and the valves are rendered insufficient in supporting the column of blood. Then strapping is employed to stimulate absorption by pressure, and cholagogues to remove hepatic obstruction. The horizontal position fulfils to a certain extent the purpose intended by the valves in the veins, of distributing pressure; thus circulation is improved; the function of the part, in short, is restored, and repair consequently ensues.

Ptyalism is a notable manifestation of the action of mercury on the glandular system. The glands and lymphatics are looked upon by some as filters; and is it not possible that ptyalism may be due to the interception of mercury in the salivary glands? and thus we can understand how the combination of iodide of potassium with mercury to such a very great extent tends to prevent salivation, by keeping the mercury in solution in the body.

Lastly, we refer to the treatment of the non-specific inflammations. The indications of treatment are, to allay irritation, relieve tension, and stimulate absorption. And these ends are accomplished, the first, by the exhibition of opium, or other sedative narcotics, for opium has no specific effect; tension is relieved by hot fomentations, bleeding, local or general, tartar-emetic, ipecachuan, or other depressants; and absorption is stimulated by such analytic remedies, if I may so call them, as mercury, iodine, iodide of potassium, nitro-muriatic acid, &c. If these indications of treatment are carried out to a successful issue, the disease is said to terminate in resolution; if not, effusion, suppuration, and such pathological sequences as have been referred to, ensue.

Though in a somewhat irregular order, I cannot bring these remarks to a close before supplying an omission bearing upon the therapeutics of gout and rheumatism—I refer to the employment of colchicum in the treatment of these affections. Few, if any, anti-arthritic remedies have such well-established or such generally-acknowledged efficacy as colchicum. Known to the ancients, it has been transmitted to us with the encomiums of antiquity; and has outlived the fate of so many of the primitive applications of early empiricism, to have its efficacy all but universally acknowledged in modern times. While colchicum possesses important vital or physiological properties to which its beneficial action in the diseases under consideration might at least be partially ascribed—for instance, its sedative effect upon the circulation—it is, however, to the peculiar property which it possesses, viz., of increasing the amount of urea, by the diminution and consequent conversion of uric acid into the former, that its curative property can be ascribed: and as this action seems to be a chemical one, I have made an exception in the classification of this drug, in placing it under the chemical agents of our *materia medica*. That it is a chemical action is rendered probable by the fact that it is not necessary to develope the physiological, in order to the production of the therapeutic effects of colchicum. I may mention that I make these statements with the full knowledge that these therapeutic properties are denied to colchicum by “authorities;” but it seems to be a state essential to the being of “authorities” that they be in direct antagonism in one thing or another to the almost universal observation and experience of their brethren. It is thus that their “discriminating faculties” are brought out in relief—thus that they form the *fodi* for the repetition of medical “facts.”

The presumable relationship between gout, rheumatism, and neuralgia is further corroborated by the beneficial effect, which, according to reliable observers—among others, Dr Rainy—is produced by the exhibition of colchicum in neuralgic affections. Thus the treatment of these diseases harmonises with what has been advanced regarding their pathology.

These, then, constitute some convictions that in the course of a few years' practice have impressed themselves on my mind. Of their many imperfections no one can be more sensible than I am myself. Yet, such as they are, they embody the principles to which I have reconciled my treatment of disease; and it were well that, as much as possible, prescription should conform more to some general law. To too great an extent the "science of medicine," it must be admitted, is a chaos of isolated particulars, false and true. Of remedies we have thousands; of diseases truly more than a sufficiency; and of opinions, their name is legion; while individual vanity and fancy find scope in making daily accessions to their number, and rendering confusion worse confounded. Surely then it were well that we pause, and deliberate whether these isolated and incoherent particulars do not admit of generalisation—whether in the maze of accumulated experience a few fundamental axioms may not be discovered; and whether, guided thus, confusion and discord may not be dispelled, and give place to harmony and order; whether the proverbial reproach of our differences may not be affiliated on the past, and our observations in due time be reconciled to reasonable and inflexible laws. It would be presumption even to hint that any such advance can be much aided by these observations. They may at least, and it is all I venture to hope for them, direct attention to a more rational classification of diseases and remedies. Their very shortcomings may show possibly that this subject affords scope for agreeable research, in the most profitable direction; and if so, they shall have been recorded to some purpose.

ERRATA.

For "oxalaria," pages 11 and 16, read "oxaluria."

For "at the same the nine fatty," &c., page 18, read, "at the same time the fatty," &c.

For "septicimæ," pages 14 and 20, read "septicæmiæ."

For "area," page 19, read "urea."

For "coeculus indica," page 28, read "indicus."

For "the promotion of urea," &c., page 34, read "formation," &c.

